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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,980	04/15/2008	Matan Naftali	P-8551-US	9434
49443	7590	11/18/2010	EXAMINER	
Pearl Cohen Zedek Latzer, LLP			TAMAL KARL I	
1500 Broadway			ART UNIT	PAPER NUMBER
12th Floor				2834
New York, NY 10036				
NOTIFICATION DATE		DELIVERY MODE		
11/18/2010		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@pczlaw.com  
Arch-USPTO@pczlaw.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/565,980	NAFTALI ET AL.
	<b>Examiner</b> KARL I.E. TAMAI	<b>Art Unit</b> 2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### **Status**

1) Responsive to communication(s) filed on 20 August 2010.

2a) This action is FINAL.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### **Disposition of Claims**

4) Claim(s) 1-3,5-20,22-24,26-32 and 34 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-3,5-20,22-24,26-32 and 34 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### **Application Papers**

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### **Priority under 35 U.S.C. § 119**

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### **Attachment(s)**

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_

5) Notice of Informal Patent Application

6) Other: \_\_\_\_\_

## DETAILED ACTION

### *Specification*

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
2. The amended title of the invention, "An Actuator having Fixed and Moveable Comb Electrodes" is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The examiner suggests "An Actuator having Repositioned Fixed and Moveable Comb Electrodes".

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

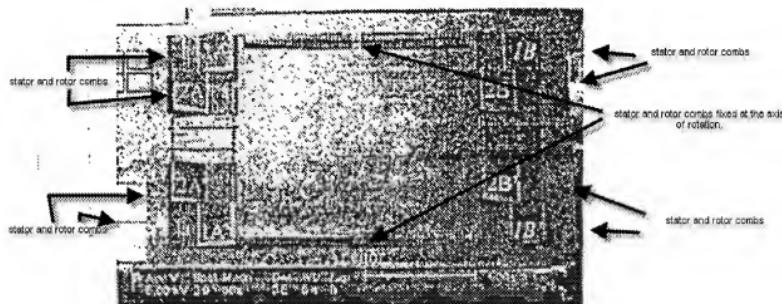
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-3, 7-9, 19, 20, 24, 26, 31, 32, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Xie et al.(Xie)(A CMOS-MEMS Micromirror with Large Out-of-Plane Actuation"). Xie teaches teaches a vertical comb drive micro motor

having a rotor comb element, the rotor comb (fig. 2) a main body and a plurality of substantially parallel extensions in a comb arrangement and at least one plurality of stator comb (fig. 2 curled) with a main body and a plurality of substantially parallel extensions in a comb arrangement to be interlaced with the rotor comb element during operation where the stator comb is repositioned with respect to the rotor comb element to establish an elevation gap (pg 90 second col. curled comb drive, line 6) between an external surface (upper surface) of the stator and rotor comb elements. Xie teaches fixing the rotor at the rotational axis.



In regards to the method of producing the comb drive, Xie teaches the stator and rotor combs from the single layer (pg 90, figs 1 and 2), with the stator combs repositioned to create an elevation gap (fig. 2).

In regards to claim 2 and 20, Xie teaches stator comb and rotor combs on opposite sides of the rotor (fig. 3, pg 91).

In regards to claim 3, Xie teaches CMOS micro machining (see pg 90).

In regards to claim 7-9, 24, and 26 Xie teach the flexible supports (metal mesh 1) are used to position both the stator and rotor combs for clockwise and counter clockwise rotation (first col., pg 91). The flexible support having a nonlinear kinematic rigidity due to the curled shape away from the support.

In regards to claims 31 and 32, Xie teaches the curled rotor combs elevated over the stator comb and the rotor combs are lower than the curled stator combs (pg 91, fig 3a).

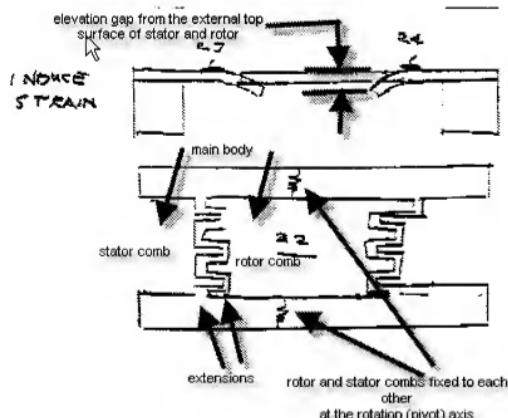
5. Claims 19, 20, 27-29, 31, 32, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamada et al. (Yamada)(US 5959760). Yamada teaches a vertical comb drive micro motor having a rotor comb element, the rotor comb (fig. 7a) a main body 2 and a plurality of substantially parallel extensions in a comb 5 arrangement and at least one plurality of stator comb a main body 7a and a plurality of substantially parallel extensions in a comb 9a arrangement to be interlaced with the rotor comb element during operation where the one stator comb 7a is repositioned with respect to the rotor comb element to establish an elevation gap (fig. 7b) between an external surface (upper surface) of the stator and rotor comb elements, and with the repositioned rotor comb element and said at least one stator comb element are fixed to each other at a rotation axis by torsion springs at 3a, 3b.

In regards to claim 20, Yamada teaches the rotor 2 is between two stators 7a, 7b

In regards to claims 27-29, Yamada teaches the torsion bars adjacent the external upper and bottom surfaces (see fig. 7b).

In regards to claims 31 and 32, Yamada teaches the rotor combs elevated over the stator comb 7a. (see fig. 11b) and lower than stator comb 7a'.

6. Claims 1-3, 7-9, 19, 20, 24, and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Hopkins, Jr. et al. (Hopkins)(US 20030082917). Hopkins (fig. 8) teaches a method of fabricating a device and an device having a rotor comb element with a main body 22 and a plurality of substantially parallel extensions in a comb arrangement and at least one of a plurality of stator comb elements with a main body and a plurality of substantially parallel extensions in a comb arrangement which are interlaced with the rotor combs at 34 in a single layer (figure 8c) of a substrate. Hopkins teaches the stator combs repositioned with an elevation gap from the external (top) surface of the rotor and stator and with the stator and rotor combs fixed by a flexure. Hopkins teaches the rotor can be pivoted (rotated) (claim 4, and ¶0008).



In regards to claims 2 and 20, Hopkins teaches two stators on opposite sides of the rotor (see 8e).

In regards to claim 3, Hopkins teaches MEMS micromachining (¶0004-0007).

In regards to claims 7-9, 24, and 26, Hopkins teaches the flexible supports 10 to precisely control the gap distances and electrode position in comb drive (see ¶0002). Hopkins teaches a nonlinear kinematic-dependent rigidity because the bend angle of the electrodes are dependent upon the input voltage V in figure 9.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 5, 6, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Hopkins, Jr. et al. (Hopkins)(US 20030082917) or Xie, in further view of Yu et al. (Yu)(US 200200121180). Each of Hopkins or Xie separately teaches every aspect of the invention except displacement limiters, particularly edges of slits around the moving body. Yu teaches slits at 611 around the moving body 610 to provide controlled stops 616, 618, 620, 622 for mover to prevent overswing and shock protection (col. 6, lines 65- col. 7, line 35), where the displacement limiters includes edges in the surrounding body 636. It would have been obvious to a person of ordinary skill in the electrostatic actuator art at the time of the invention to construct the actuator

of Hopkins or Xie with the edges of the slits providing travel stops to prevent overswing and shock protection, as taught by Yu.

9. Claims 10-12 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopkins, Jr. et al. (Hopkins)(US 20030082917) or Xie, in view of Yamada et al. (Yamada)(US 5959760). Each of Hopkins or Xie separately teaches every aspect of the invention except the flexures being two torsion bars adjacent an external surface of the rotor comb element, with the torsion bars being near an upper surface and a bottom surface. Yamada teaches torsional support 3a, 3b for an electrostatic actuator which extends vertically near the upper and lower surface of the rotating plate to allow the torsion bars to be integrally formed with the moving plate 2 (col. 4, lines 65-67) and to allow the rotor to be vibrated around an axis (col. 1, lines 25-30). It would have been obvious to a person of ordinary skill in the electrostatic actuator art at the time of the invention to construct the actuator of Hopkins or Xie with the torsion bars adjacent the rotor combs to provide to support the rotor and be integrally formed therein, as taught by Yamada.

10. Claim 13 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopkins, Jr. et al. (Hopkins)(US 20030082917) or Xie, in view of Suzuki (US 5554304). Each of Hopkins or Xie separately teaches every aspect of the invention except aspect of the invention except the thickness of the stator being greater than the mover. Suzuki teaches the thickness of the stator teeth are varied to control and balance the forces

between the moving and stationary teeth (see figures 1, 3, and col. 10, lines 55-65). It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the actuator of Hopkins or Xie with the teeth of Suzuki to balance and control the movement of the rotor.

11. Claims 14, 15, 18, 31, 32, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopkins, Jr. et al. (Hopkins)(US 20030082917) or Xie, in view of Yamada et al. (Yamada)(US 5959760). Each of Hopkins or Xie separately teaches every aspect of the invention except aspect of the invention except the stator being above or below the rotor, AC periodic switching frequency, and the rotor having a mirror. Yamada teaches the stator above and below the rotor (see figure 10b) in an optical mirror 2 MEMS device. Yamada teaches an AC signal is used to Yamada teaches AC periodic frequency switching to synchronize the drive pulses and operate the mirror in resonance state (col. 6, lines 37-65). It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the actuator of Hopkins or Xie with the stator electrodes above or below as in Yamada to balance and control the movement of the rotor.

12. Claim 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopkins, Jr. et al. (Hopkins)(US 20030082917 or Xie, in view of Mao et al.(Mao)(US 6771001). Each of Hopkins or Xie separately teaches every aspect of the invention except controlling motion of the rotor by selecting frequencies of rotor motion thereby

determining a first time interval of confined motion characterized as the time during which the motion of the rotor is limited by motion limiters and direction of motion is reversed, and a second time interval during which the motion of the rotor is not limited, and tuning the frequencies to a desired ratio between the first time interval and the second time interval. Mao teaches selecting the pulse durations with no limits (minimum) and with a limit (maximum) and selecting (tuning) the drive voltage pulse and duration accordingly (col. 13, lines 8-25) to prevent damage to the actuator from overshooting (col. 5-15). It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the actuator of Hopkins or Xie with a controlling motion of the rotor by selecting frequencies of rotor motion thereby determining a first time interval of confined motion characterized as the time during which the motion of the rotor is limited by motion limiters and direction of motion is reversed, and a second time interval during which the motion of the rotor is not limited, and tuning the frequencies to a desired ratio between the first time interval and the second time interval, to prevent damage from overshooting in a comb actuator, as suggested by Mao.

13. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hopkins, Jr. et al. (Hopkins)(US 20030082917) or Xie, in further view of Turner et al. (Turner)(US 6497141). Each of Hopkins or Xie separately teaches every aspect of the invention except the driving alternating voltage to achieve a periodic switching frequency of the rotor comb element. Turner teaches driving with an alternating voltage with periodic

switching frequencies of the rotor to operate in stable and unstable regions for increased sensitivity in taking atomic force measurements (col. 3, lines 15-35). It would have been obvious to a person of ordinary skill in the electrostatic actuator art at the time of the invention to construct the actuator of Hopkins or Xie with the driving alternating voltage to achieve a periodic switching frequency of the rotor comb element to provide stable and unstable regions for increased sensitivity in taking atomic force measurements, as taught by Turner.

***Response to Arguments***

14. Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new grounds of rejection.

***Conclusion***

15. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai whose telephone number is (571) 272 - 2036.

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mrs. Quyen Leung, can be reached at (571) 272 - 8188. The facsimile number for the Group is (571) 273 - 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Karl I Tamai/  
PRIMARY PATENT EXAMINER  
October 27, 2010